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ULTRASONIC EVALUATION OF SCROTAL SWELLINGS

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The diagnostic value of ultrasonography for 101 scrotal swellings of 94 patients was assessed. The 101 swellings showed sonographically 87 extratesticular, 11 testicular and 3 combined lesions. This sonography was concluded to be a satisfactory diagnostic aid for scrotal cystic lesions, testicular tumors and the localization of scrotal lesions.

Key words: Ultrasonography, Real-time secta scanner, Scrotal swellings

INTRODUCTION

It is the general view that scrotal swellings caused by various pathological lesions often are considerably difficult to diagnose differentially and the available diagnostic methods other than physical examination and surgical exploration are limited. A mistaken diagnosis has been reported to have been made in over one-fourth of the cases with testicular lesions. In various series of testicular neoplasia, the incidence of initial diagnosis of epididymitis ranged from 6 to 16.3 per cent and that of hydrocele from 2 to 5 per cent[1]. Recently, ultrasonography has been adopted for the evaluation of tumorous or cystic lesions in the urological field, but there have been few reports of ultrasonic evaluation of scrotal contents. We studied the diagnostic value of ultrasonography in 101 scrotal swellings.

MATERIALS AND METHODS

The 101 scrotal swellings in 94 patients were examined with a commercially available B-mode ultrasound instrument (ALOKA USI-51 Tokyo, Japan) equipped with a hand type mechanical real-time secta scanner (ALOKA ASU-25-OG Tokyo, Japan). This scanner was 50 mm in focal distance and 5 MHz in frequency. It had a bag containing about 40 ml of liquid paraffin at the top of the probe, and could make a quite clear ultrasonogram of superficially located organs like scrotal contents on the central area of an echographic image.

The patients lay supine on a bed. The scrotal sac was then coated with an aqueous gel. The examiner held the testis with the left hand and moved the scanner with the right hand. As a rule, serial longitudinal scans from the cranial to caudal pole of the testis were performed. For comparison, the contralateral testicles were studied. Permanent records of sonograms were made using Polaroid film.

Scrotal abnormalities were classified into 3 types of extratesticular, testicular and combined involvement lesions. In addition, internal echoes were grouped by cystic, solid and mixed patterns.

The final diagnosis was established by surgical exploration for 26 of the 101 scrotal swellings. In the remaining 75 cases, clinical correlation in conjunction with a prolonged follow-up was believed sufficient for accurate diagnosis.

RESULTS

The normal testicular mass was sonographically observed as a homogenous granular texture showing medium echoge-

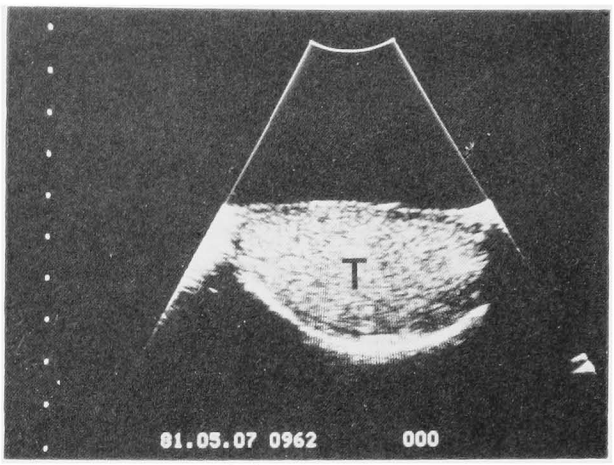
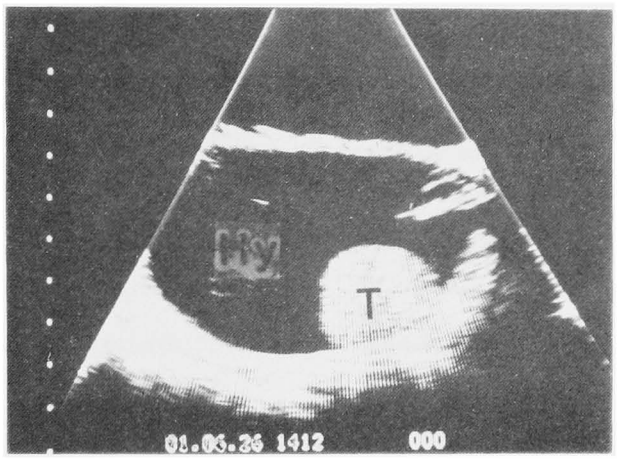


Fig. 1. The normal testis (T) is observed as a homogenous granular texture showing a medium echogenicity. Ultrasonographic identification of the rete testis, tunica albuginea, epididymis is not normally established.

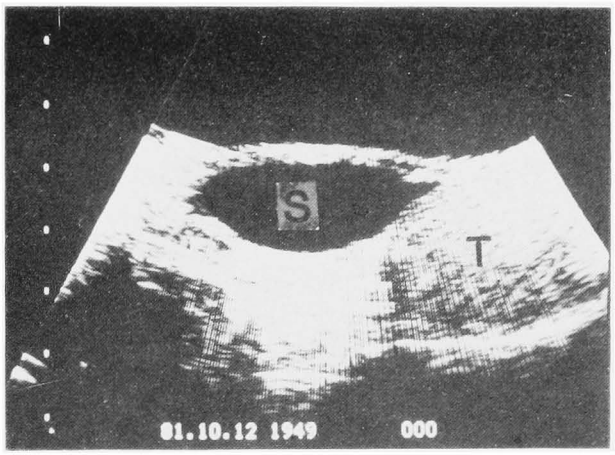
nicity. Ultrasonographic identification of the intact tunica albuginea and rete testis was not established. The epididymis was as usual difficult to outline as a whole (Fig. 1).

The 101 swellings were classified sonographically into 3 groups; 87 extratesticular, 11 testicular and 3 combined lesions. Of the 87 extratesticular lesions, 45 showed the cystic pattern and consisted of 33 hydroceles, 7 spermatoceles and 5 varicoceles (Fig. 2). Although all the hydroceles studied showed a clear echo-free interior on sonography, 5 hydroceles were not clinically transilluminant. In 2 of these 5 hydroceles, surgical exploration confirmed the presence of hydroceles with a thickened tunica due to chronic inflammation, although physical palpation and transillumination were not helpful for evaluating the scrotal contents of the other cases with severe edema due to liver cirrhosis, ultrasonic examination showed a fluid-filled hydrocele surrounding the testis. Of the 42 swellings characterized by the solid and mixed patterns in the 87 extratesticular lesions, 36 swellings were epididymitis, 4 swellings were scrotal abscess and the remaining 2 swellings were torsion of the appendix testis (Table 1). Concerning epididymitis, 23 and 13 swellings were acute and chronic epididymitis, respectively. All of these 36 swellings showed an enlargement of the epididymis with or without a variable degree of echo-free area in which reactive hydrocele appeared. The echogenicity of acute epididymitis tended to faint diffusively (Fig. 3A), while that of chronic epididymitis increased (Fig. 3B). In 2 torsions of the appendix testis, as the ultrasonogram showed only slight enlargement and decreased echogenicity of the epididymis; it was quite impossible to make an ultrasonic diagnosis of torsion.

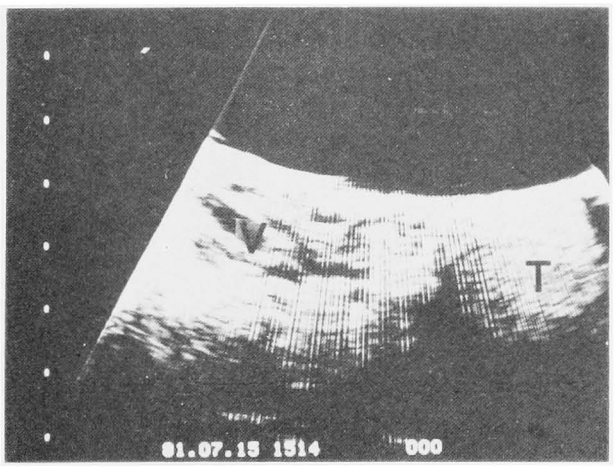
The 11 testicular lesions consisted of 6 pure seminomas, 1 anaplastic seminoma, 1 spermatocytic seminoma, 1 teratoma and 2 embryonal cell carcinomas with and without seminoma. In general, these lesions had areas of a decreased echogenicity in the testis, when compared with the contralateral normal testis. All of the 6 pure seminomas and 1 embryonal cell carcinoma with seminoma gave a solid pattern and the other 4 testicular tumors the mixed pattern (Table 2). It was very difficult to assume the histological type of the tumors by ultrasound findings. Although, all cases of seminomas showed a solid pattern regardless of the size of mass. In 5 masses of histological type, other than seminoma, 3 of 4 tumors more than 5 cm in size appeared in a [mixed]



A



B



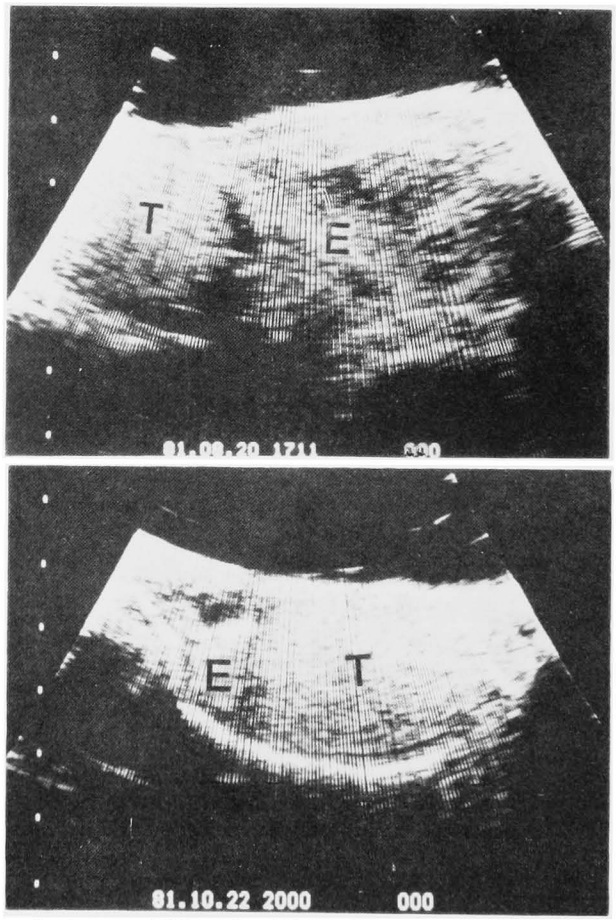
C

Fig. 2. A, Hydrocele. Longitudinal echogram shows the normal testis (T) with echo-free hydrocele cavity (Hy). B, Spermatocele. Sonolucent, cystic area (S) is seen at upper pole of testis (T). C, varicocele. Cluster of cystic echoes (V) is seen at upper pole of testis (T).

Table 1. Comparison of ultrasonic findings and final diagnosis

Extratesticular lesions

Ultrasonic Findings		Ultrasonic Diagnosis		Final Diagnosis		Accuracy Rate (%)
Cystic	45	Hydrocele	33	Hydrocele	33	
		Spermatocele	7	Spermatocele	7	100
		Varicocele	5	Varicocele	5	
Solid	24	Epididymitis	24	Epididymitis	24	100
Mixed	18	Epididymitis	14	Epididymitis	12	
		Abscess	4	Abscess	4	88.9
				Torsion of the Appendix Testis	2	



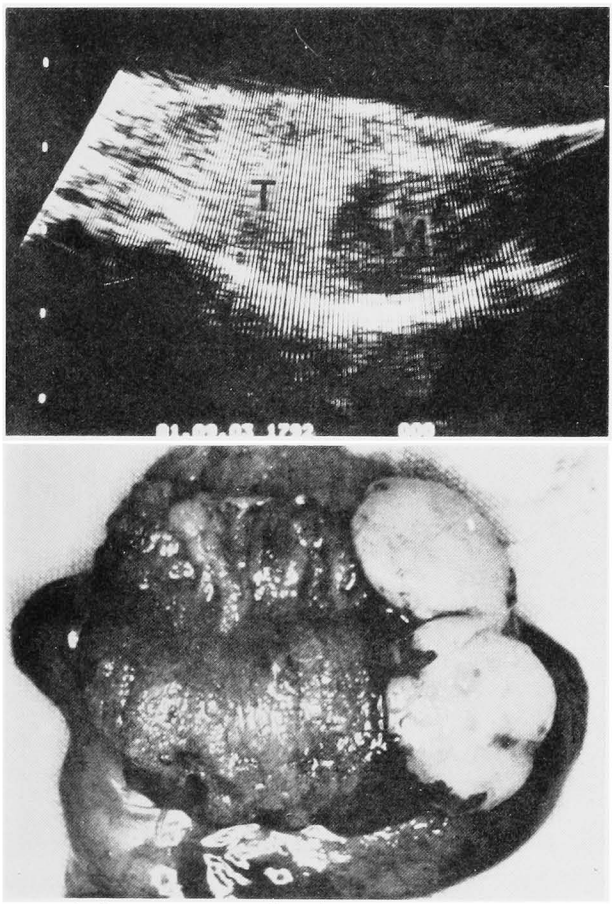
A

B

Fig. 3. A, Acute epididymitis. The enlarged epididymis (E) is seen next to the caudal pole of testis (T). The echogenicity of epididymis is diffusively faint. B, Chronic epididymitis. The echogenicity of enlarged epididymis (E) increase.

Table 2. Comparison of ultrasonic findings and final diagnosis
Testicular lesions

Ultrasonic Findings		Ultrasonic Diagnosis		Final Diagnosis		Accuracy Rate (%)
Solid	7	Tumor	6	Seminoma	6	85.7
		Epididymitis	1	Seminoma with Embryonal Cell Carcinoma	1	
Mixed	4	Tumor	4	Spermatocytic Seminoma	1	100
				Anaplastic Seminoma	1	
				Embryonal Cell Carcinoma	1	
				Teratoma	1	



A

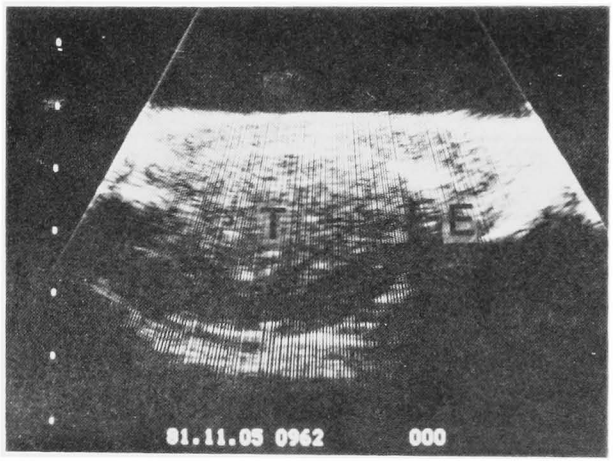
B

Fig. 4. Testicular tumor. A, Longitudinal sonogram shows a 2 by 2 cm mass (M) with a low echogenicity at the lower pole of the right tiestis (T). B, A gross specimen of the case illustrated in Fig. 4A. Pathological diagnosis is seminoma.

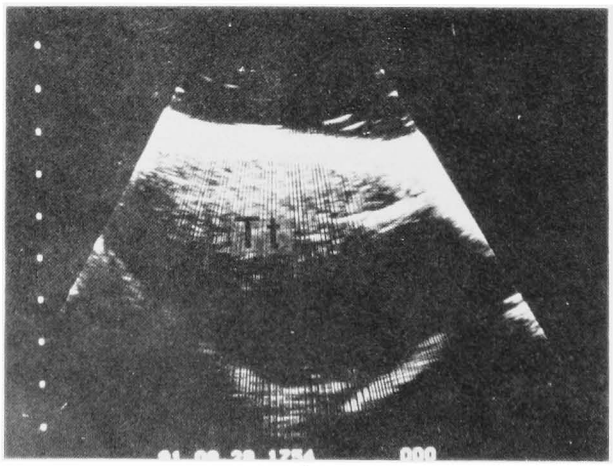
Table 3. Comparison of ultrasonic findings and final diagnosis

Combined lesions

Ultrasonic Findings		Ultrasonic Diagnosis		Final Diagnosis		Accuracy Rate (%)
Solid	2	Epididymitis	1	Epididymitis	1	
		Tumor	1	Epididymo-orchitis	1	67
Mixed	1	Rupture	1	Rupture	1	



A



B

Fig. 5. A, Longitudinal sonogram of epididymo-orchitis shows marked testicular (T) and epididymis (E) swellings. Its testicular sonogram with low echogenicity is difficult to differentiate from the testicular tumor (T) as shown in Fig. 5B.

pattern of intratesticular lesion. One teratoma less than 5 cm in size showed a mixed pattern. The diagnosis of the patient demonstrated in Fig. 4, was chronic epididymitis on routine examinations and he received antibiotics for 4 weeks. During physical examination, an index finger-tip-sized node was noted in the tail of the right epididymis without any clear margin between the testis and epididymis. Ultrasound revealed a 2 by 2 cm mass with a low echogenicity at the lower pole of the right testis, indicating the presence of a testicular mass separated from the epididymis. On the basis of these findings, right orchiectomy was performed and its pathological diagnosis was seminoma. In addition to this case, there were 2 other similar cases in which it was difficult to differentiate the epididymitis on physical examination. One tumor showed a 2.5 by 1.3 cm low echogenicity mass in the lower pole of the left testis in contact with the epididymis. An ultrasonic diagnosis of testicular tumor was made. Microscopic examination of the nodule revealed a teratoma. The remaining one which was seminoma histopathologically was mistakenly diagnosed as epididymitis due to the absence of testicular enlargement in spite of showing low echogenicity of the nodule ultrasonographically.

There were 3 scrotal swellings in the combined lesion. Two lesions showed a solid pattern and the final diagnosis were epididymitis 1 and epididymo-orchitis 1. The remaining lesion showed a mixed pattern and its final diagnosis was testicular rupture (Table 3). As shown in Fig. 5A, the case of epididymo-orchitis showed marked testicular and epididymis swellings and its testicular sonogram was difficult to differentiate from that of a typical testicular tumor shown in Fig. 5B.

DISCUSSION

In the group of extratesticular lesions, ultrasonic diagnosis was in close agreement with the final diagnosis. Especially, the fluid-filled nature of the scrotal swellings was well recognized on ultrasound, and ultrasound appeared to be a useful method for patients with hydrocele not clinically transilluminating. Leopold and associates[2] reported difficulty of differentiation between hydrocele and spermatocele. In our present study, we could differentiate both of the lesions with ultrasonic findings. Spermatocele arose in a position above the testis and it never involved the entire anterior surface of the testis as a hydrocele would. It had a clear cystic wall with high ecogenicity. Epididymitis uniformly showed enlargement of the epididymis. Acute epididymitis had a tendency to appear with a diffuse lucency of the epididymis that was presumably due to the edema content of the tissue.

Several authors have reported the usefulness of ultrasound in testicular tumors[2~9]. As mentioned above, our experience with a seminoma patient that was initially thought to have epididymitis on clinical examinations supported this usefulness. Ultrasonic examination has been reported to be an effective method for detecting occult tumors when the scrotal examination is entirely normal[6~8]. Sample[7] has mentioned that very small primary testicular tumors can be resolved as focal or diffuse changes in the gray scale texture of the testis because of the fine granular texture of the normal testis on the ultrasonograms. All of the testicular tumors studied showed areas of decreased echogenicity in the testis and abnormal echogenic patterns, but it was very difficult to assume the histological type of the tumors. In addition, the sonographic differentiation of the tumors from benign conditions occurring at the testicular region was difficult, as we could not make a correct diagnosis in the case of epididymo-orchitis. A focus of low-level echogenicity within the testis is not specific for a tumor, as a number of benign conditions could be presented with similar findings. In other words, when an abnormal testicular mass is demonstrated by ultrasonography, neoplastic lesions should be initially considered until further investigations are established. Further studies into the histopathological and differential diagnosis are necessary.

From the results obtained, it was concluded that this sonography is a satisfactory diagnostic aid for scrotal cystic lesions, testicular tumors and the localization of scrotal lesions.

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和文抄録

陰嚢内腫瘤に対する超音波診断の検討

金沢大学医学部泌尿器科学教室（主任：久住治男教授）
三崎　俊光・久住　治男・西東　康夫

94症例に認められた101陰嚢内腫瘤に対し実時間表示セクタスキャナー（5 MHz）を用いた超音波断層法を施行し，以下の成績を得た．

1） 101腫瘤を陰嚢内の病変部位により睾丸外，睾丸内および両者の合併病変の3型に分類したところ，睾丸外87腫瘤，睾丸内11腫瘤および合併病変3腫瘤であった．

2） 腫瘤の内部エコー像の所見を cystic pattern, solid pattern および mixed pattern に分類し，またその超音波画像診断と最終診断を比較検討した．睾丸外に認められた87腫瘤においては cystic pattern を示したもの45腫瘤（陰嚢水瘤33，精索水瘤7および精液瘤5），solid および mixed pattern を示したものは42腫瘤（副睾丸炎36，陰嚢内腫瘍4および睾丸虫垂捻転2）であり，陰嚢水瘤をはじめとして貯留性疾患に対してはとくに超音波断層法が有効であり，全例において超音波診断と最終診断との一致が認められた．睾丸内に病変が認められた11腫瘍は全例睾丸腫瘍であり，solid pattern を示したもの7腫瘤，mixed pattern を示したものが4腫瘤であった．診断一致率は91％と良好であったが，超音波画像上より腫瘍の組織型を推測することは困難であった．触診上，副睾丸炎との鑑別がきわめて困難であった3腫瘍中2腫瘍は超音波断層法により睾丸腫瘍の診断がなされた．混合病変の3腫瘤においては2腫瘤が solid pattern（副睾丸炎1，副睾丸・睾丸炎1）を示し，残りの1腫瘤は睾丸破裂で，その超音波画像上の所見は mixed pattern であった．診断一致率は67％であった．